(2) Wellhead Protection

Existing Conditions

In order protect, enhance, and restore water resources throughout the Highlands Region, it is imperative that particular attention be paid to public water supply wells that provide potable water to Highlands municipalities. In order to prevent the contamination of ground water resources, and in accordance with the Safe Drinking Water Act, NJDEP has identified all public water supply wells in the State and their delineated Wellhead Protection Areas (WHPAs).

A Wellhead Protection Area is a mapped area around a public water supply well that delineates the horizontal extent of ground water captured by a public water supply well pumping at a specific rate over a specific time. A WHPA has three tiers which serve to delineate priority areas for the protection of ground water quality. Tier 1 is a two-year time of travel, (i.e. the ground water within this tier flows to the well within a two-year time period). Tier 2 is equivalent to a five-year time of travel, while Tier 3 is equivalent to a twelve-year time of travel.

The public water supply wells are grouped into two categories based on the type of water supply system they support. Public community water supply systems have at least 15 service connections used by year-round residents, or regularly serve at least 25 year-round residents. An example is a municipal system that services single-family residential homes. A non-community water system is a public water system used by individuals other than year-round residents, such as hospitals or restaurants, for at least sixty days of the year.

The delineated WHPAs for public community water supply systems in the Highlands Region are depicted in the map entitled *Wellhead Protection Areas*. A total of 580 public community water supply WHPAs have been delineated and mapped in the Highlands. As can be seen, these wells are almost always located in close proximity to the development they serve, posing a significant risk for well contamination from existing and past land uses. In fact, many public community water supply wells have been polluted over the years and were either closed or provided with sophisticated treatment prior to continued public use.

The New Jersey Source Water Assessment Program Plan prepared by NJDEP describes the various sensitivity and intensity factors of concern used to develop the susceptibility ratings for groundwater and surface water drinking water sources for the following categories of contaminants: pathogens, nutrients, pesticides, volatile organic compounds, synthetic organic compounds, inorganics, radionuclides, and disinfection byproduct precursors. Numerous sites and activities were included in the Potential Contamination Source Inventories, including agriculture land use, bulk chemical, contaminated soils, discharges to surface and ground water, highway runoff, industrial and commercial point sources, known contaminated sites, leaking sewer lines, mining operations, naturally occurring contaminants (e.g. arsenic, asbestos, radium, radon), recreational activities (e.g., golf courses), septic systems, leaking underground storage tanks. and wastewater treatment plants, among others. Each of these sources is linked to water quality data appropriate to the source in question.

Individual reports have been created for each of the community water systems and the non-community water systems relying on surface water. These reports provide the susceptibility ratings for each water system source per contaminant category. In order to gain an understanding of the relative susceptibility of each supply source to specific types of contamination, each well or intake was assigned a rating of low, medium, or high susceptibility for each of the eight categories of contaminants. The ratings are based on a comparison to drinking water standards, or maximum contaminant levels for the contaminants of concern. A low rating indicates wells or intakes that are unlikely to equal or exceed one-tenth the maximum contaminant levels for a particular contaminant, a medium rating one-half the maximum contaminant levels, and a high rating indicates where contaminant concentrations may exceed one-half the maximum contaminant levels.

The individual source water assessment reports and supporting documents are available at http://www.nj.gov/dep/swap/. For unconfined wells, the three contaminant categories with the highest percentage of pollutant sources receiving a high susceptibility rating are nutrients (67%), volatile organic compounds (61%), and radon and radionuclides (50% and 49%). For ground water, confined wells, only the disinfection byproduct precursors contaminant category contains wells that received a high susceptibility rating (27%). When reviewing the results of the medium susceptibility ratings for confined wells, the three contaminant categories in which a high percentage of the wells

rated medium are disinfection byproduct precursors (70%), inorganics (47%), and radionuclides (39%).

Goals and Requirements of the Highlands Act

The Highlands Act recognizes the importance of the Highlands Region as the "essential source of drinking water, providing clean and plentiful drinking water for one-half of the State's population." (Section 2). It also recognizes the ecological importance of clean water. The need to protect, enhance and restore water quality is fundamental to ensuring that there are adequate water supplies to support these needs.

The Highlands Act includes a goal to "protect, restore and enhance water quality and quantity of surface and ground waters." (Section 10.a. and 10.b). This Plan must determine "the amount and type of human development and activity which the ecosystem of the Highlands Region can sustain while still maintaining the overall ecological values thereof, with special reference to surface and ground water quality and supply…" (Section 11.a.(1)(a)).

The Highlands Plan Approach

In furtherance of the requirements and goals of the Highlands Act, the Plan focuses on four areas of action to address the need to protect wellhead protection areas:

- Identify wellhead protection areas in need of protection
- Develop resource protection measures to protect and enhance ground water and water supply resources using source water assessments for each water supply source
- Develop educational materials to further the understanding of the importance of WHPAs and methods of protecting the water supply and ground water resources
- Develop implementation measures that include resource protection measures and other best management practices

The need to protect water supplies is fundamental to ensuring that there are adequate water supplies to support human development and activities in the Highlands Region and in those areas of the State that rely on Highlands waters. Most Highlands municipalities with public water supply systems

are entirely reliant on Highlands aquifers. Protection of the quality of those potable water supply wells is critical to the sustainability of Highlands communities.

This Plan incorporates wellhead protection concepts from the Federal Safe Drinking Water Act and NJDEP's Source Water Assessment Reports, restricting the types of new land uses within WHPAs and minimizing the potential for pollutant discharges to them from both new and existing land uses within the Highlands Region.

The technical basis and additional background information on wellhead protection areas can be found in the Highlands Council's technical report entitled *Water Resources Technical Report*.

Policies

With regard to the protection and restoration of public water supply wells of the Highlands Region, the Highlands Council hereby establishes policies to further the goals and requirements of the Highlands Act.

General Policies

POLICY: The Highlands Council shall maintain an inventory of wellhead protection areas to protect public water supply wells of the Highlands Region.

POLICY: The Highlands Council shall incorporate new wellhead protection areas as defined by NJDEP.

Site-Specific Standards

POLICY: The Highlands Council shall implement the following resource protection standards to provide for the protection of wellhead protection areas on a site-specific basis during site plan review:

- Prohibit land uses that would result in the discharge of pollutants to ground water or to the land surface such that they may degrade ground water quality, in accordance with the three-tier approach for wellhead protection. Tier 1 encompasses the land area within a two-year time of travel to the wellhead, requiring protection through

exclusion of pathogen sources; Tier 2 is a five-year time of travel, requiring protection through exclusion of persistent organic chemicals sources; and Tier 3 requires management of toxic chemical sources and prohibition of major discharges or hard to remediate sources

- Prohibit new development activities within Tier 1 of a WHPA and facilitate permanent preservation of Tier 1 lands for passive open space purposes, wherever feasible
- Prohibit septic system discharges and engineered or enhanced infiltration of stormwater within Tier 1
- Prohibit discharges of non-sanitary wastewater effluent within Tiers 1 and 2

POLICY: The Highlands Council shall implement design standards in order to encourage appropriate conservation based design, including the following:

- Require the recharge of clean stormwater to WHPAs
- Require stormwater reuse for non-agricultural irrigation and other non-potable water purposes to minimize the volume of stormwater discharges within Tiers 1 and 2 of WHPAs
- Require best management practices for agricultural and other irrigation practices affecting WHPAs

Pre-Conformance Policies

POLICY: Prior to initiation of the conformance period, and in furtherance of the Highlands Act, the Highlands Council shall take actions that include the following:

- Develop technical guidelines and procedures for the identification of potable sources at risk and protection of wellhead protection areas for public water supply wells in the Highlands Region, including an evaluation of pollutant sources and the three-tier WHPA delineation system based on the two, five, and twelve-year time of travel to the well
- Develop technical guidelines and procedures for wellhead protection best management practices to protect ground water quality in WHPAs

- Develop model master plan elements and development regulations for wellhead protection

Conformance Policies

POLICY: During the conformance period, and in furtherance of the Highlands Act, the Highlands Council shall take actions that include the following:

- Require that conforming municipalities and counties include wellhead protection standards and guidelines consistent with this section
- Require conforming municipalities to revise master plans and development regulations to address wellhead protection requirements, to include the restriction on development activities that pose threats to the water quality of public water supply wells, and to ensure that development activities and existing development implement best management practices to protect the quality of ground water within wellhead protection areas
- Require conforming municipalities and counties to revise wastewater management plans to demonstrate that the proposed service area will not adversely impact a WHPA

Long Term Policies

POLICY: To establish long term goals to ensure continued refinement and development of the Regional Master Plan, the Highlands Council shall take actions that include the following:

- Develop a program for improving protection of public water supply wells through retrofit or upgrades of existing land uses in a WHPA, including methods for reducing the actual or potential discharge of pollutants
- Identify potential sites for future public water supply wells and implement wellhead protection approaches (including land preservation) in advance of well construction to minimize the potential for contamination of the ground water that will flow to those wells

Local Participation Policies

POLICY: To promote the understanding and support for these resource protection goals at the local level, the Highlands Council shall take actions that include the following:

- Develop an educational program for municipal and county officials and other stakeholders on wellhead protection ordinances
- Develop a training and educational program for municipal and county planning boards and environmental commissioners on concepts, approaches and methods for wellhead protection

Coordination and Consistency Policies

POLICY: To promote the active participation in the implementation of the Regional Master Plan among State and Federal agencies, the Highlands Council shall take steps that include the following:

- Develop a coordinated monitoring program with NJDEP to track changes in the water quality and potential risks to public water supply wells in the Highlands Region
- Develop a coordinated program with NJDEP to incorporate new WHPAs in the Regional Master Plan as they are mapped in response to the development of new public water supply wells
- Develop technical guidance with the New Jersey Department of Agriculture and other governmental agencies to promote best management practices for water conservation, water reuse, and irrigation efficiency in farming and other operations for the protection of public water supply wells

GLOSSARY

[These terms will be in the glossary at the back of the Regional Master Plan but are included here for convenience of Members during the review of this draft section].

Hard to remediate sources - include those facilities and/or activities having either multiple or diffuse inputs (e.g., failing septic systems), discharging constituents with long residence times or limited attenuation in ground water (e.g., radionuclides), and/or are known to be either difficult or expensive to remediate through active treatment processes (e.g., dense non-aqueous phase liquids). Other geological, chemical or engineering factors can also result in difficulty choosing and implementing remedial options.

Major discharges - include those for which a NJPDES discharge to ground water permit is required. Examples include but are not limited to discharges of sanitary wastewater from housing developments, schools, businesses, factories; discharges of industrial wastewater and some stormwater discharges. Sanitary landfills and hazardous waste facilities can also be considered potential major dischargers to ground water. These discharges often use injection wells (including subsurface disposal systems serving facilities with an aggregate design flow in excess of 2,000 gallons/day); infiltration/percolation lagoons; spray irrigation; overland flow systems; surface impoundments; dredge spoils; and residuals surface impoundments.

Wellhead Protection Area (WHPA) - A WHPA is defined as a mapped area around a public community or non-community water supply well that delineates the horizontal extent of ground water captured by a public water supply well pumping at a specific rate for a specific time. A WHPA has three tiers. Tier 1 is a two-year time of travel, i.e., the ground water within this tier flows to the well within a two year time period. Tier 2 is equivalent to a five-year time of travel, while Tier 3 is equivalent to a twelve-year time of travel. These travel times were selected to reflect the potential for bacterial and viral contaminant movement (Tier 1), limitations on technological options for preventing long-lived contaminants from reaching a well without interfering with well function (Tier 2) and the longest times of travel customarily seen in New Jersey for plumes of long-lived contaminants (Tier 3). NJDEP performed ground water source delineations for all public community water systems using the Combined Model/Calculated Fixed Radius Method. Public non-community water systems were delineated using the Calculated Fixed Radius Method.